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ABSTRACT

This review provides a synthesis of selected research literature addressing the connection between social interaction and academic achievement, and the learning of children in the context of formal schooling. Evidence from approximately 100 research studies is presented which supports the hypothesis that human interaction is a critical factor in the cognitive development and subsequent academic achievement of children. Discussion is organized in terms of: (1) influence of social relationships on cognitive development, including socio-cognitive conflict in cognitive development and the influences of peers versus adults; (2) cooperative learning; (3) affective education; (4) the influence of persons, including significant adults, and the impact of others in general; (5) the anthropology of education; and (6) the importance of an enriched social environment. It is concluded that the literature strongly supports the idea that social relationships contribute in significant ways to cognitive development. Cognitive conflict within the context of social relationships appears to have a significant impact on cognitive development. Reciprocity between persons engaged in a social interaction also seems to be an important element in the social construction of knowledge. Concluding discussion concerns additional findings from subsets of the literature, implications for teacher education, and directions for future research. A total of 74 references are cited. (RH)

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The Connections between Social Relationships and Academic Achievement: A Selective Review of the Literature with Implications for Teacher Education

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Abstract

Existing educational theories do not sufficiently explain the success of various teachers identified as excellent. In addition, little is known about the reasons some students are able to learn from even the most marginal teacher. One variable which holds promise for better understanding these situations relates to the quality of the relationship which exists between the teacher and the student. Although theories exist which advocate the connection between social relationships and academic achievement, educational researchers have not paid much attention to the topic. The purpose of this review is to provide a synthesis of selected research literature addressing the connection between social interaction and academic achievement. Conclusions drawn from the literature strongly support the notion that social relationships contribute significantly to cognitive development and subsequent academic achievement. Suggestions for future research and the implications for teacher education are discussed.

The Connections between Social Relationships and Academic Achievement: A Selective Review of the Literature with Implications for Teacher Education

Contemporary instructional theory has not sufficiently explained the success of teachers who are generally regarded as being excellent, yet as a group demonstrate a great variety of teaching styles . In addition there is little understanding of the reasons why some students are able to learn from teachers who are considered marginal at best. What may be a critical factor for understanding the learning which occurs is the quality of the relationship between teachers and students. Even though theories supporting the importance of social relationships in cognitive development have been in existence for some time, formal attempts to study the educational significance of social relationships as they relate to the academic achievement of children have been scarce.

In a previous paper Simpson and Galbo (1986) proposed a theoretical basis for understanding the function of social interaction as a critical component in all learning including formal school learning. Existing practice tends to treat social interaction as a factor which enhances learning. The authors, in contrast, propose that social interaction is more than an enhancing agent. Social interaction is seen as central to the learning process. The authors acknowledge the virtues of traditionally conceived "good" student/teacher relationships as well as a humanistic approach to classroom teaching, but they are trying to go beyond existing theory and practice by proposing a more comprehensive theoretical basis for considering the function of social interaction in learning.

In order to determine if this proposed theory has merit, the research literature was extensively surveyed beyond the level permitted in the theoretical paper. Much of the pertinent literature was found outside the field of education or within education in categories not directly related to the topic under study. The purpose of this paper, then, is to report the results of that survey by presenting the research evidence, not speculations nor opinions, which supports the hypothesis that human interaction is a critical factor in the cognitive development and subsequent academic achievement of children. In addition, the conclusions which are drawn are intended to provide educational researchers and practitioners with a foundation on which to base future endeavors.

Definitions

For the purposes of this paper the terms cognitive development, academic achievement, and formal school learning will be used interchangeably. Social interaction and social relationships are defined as all manner of behaviors in which individuals and groups act upon each other. Social relationships or social interaction is an emerging process in which the essential characteristic is reciprocity.

Background of the Problem

Various scientists and philosophers have espoused the importance of the social side of existence in human development (Bandura, 1977,1986; Dewey, 1916/1966,

1938/1963; Mead, 1934; Piaget, 1932/1965, 1972; Sullivan, 1953; Vygotsky, 1962, 1978). Even though these ideas have existed for some time, the role of social interaction in cognitive development has not received much attention in the research mainstream. Most often research about social relationships has been considered valuable for extending our understanding about social and emotional development. Even less is known about the importance of this process for the context of the school and almost none of the research has focused on adolescents.

The Evidence

The author spent over five years collecting research data. No attempt was made to find conflicting evidence. Data were sought which, in the author's perception, were sound research studies. Studies which were part of a body of existing literature rather than isolated studies were selected. For example, the research studies which are presented reflect dozens and in some instances over a hundred studies as in the case of cooperative learning rather than one or two isolated examples. Computer searches were conducted which focused on social relationships or social interaction as they related to cognitive development, school learning, and academic achievement. Every source which showed promise either based on the title or reading the abstract was reviewed. Every source which appeared to pertain to the topic was read and each bibliography was scanned for other related sources.

Several hundred journal articles and books were reviewed from a wide variety of disciplines in order to arrive at the approximately one hundred references used in this paper. Although the primary studies attempting to understand this relationship have been conducted by social psychologists from Western Europe, other research conducted in fields such as education, psychology, and animal biology also add depth to understanding the topic. Yet, these studies have been conducted without coordination among the various disciplines; no reviews of the literature exist up to this time which directly address this connection. As a result, the previous picture is fragmented and lacks cohesiveness. This review is intended to add clarity to the variety of elements which compose the existing literature addressing the connection between academic achievement and social relationships while exploring the important implications of the social construction of knowledge for the schooling of contemporary youths.

Influence of Social Relationships on Cognitive Development

Several researchers (Attili, 1985; Damon, 1983; Day, French, & Hall, 1985; Doise & Mugny, 1984; Doise, Mugny, & Perret-Clermont,1975, Doise & Palmonari, 1984; Hinde, Perret-Clermont, & Stevenson-Hinde, 1985; Krappmann, 1985; Perret-Clermont, 1980; and Rutter, 1985) have adopted the position that cognitive development is primarily a social phenomenon. These researchers view cognitive development differently from earlier social learning theorists with regard to the degree to which they believe all cognition, including intellectual development, is fundamentally social in origin. Their perspective asserts that no learning occurs in a social vacuum. Doise and Mackie (1981) state:

> ...that cognitive development results not only from a simple interaction between the child and the physical environment, but more importantly from the active reconstruction of cognition which takes place in interactions between the child and other active social beings. Cognitive structures are developed first between individuals and only later become characteristic of the individual child. (p. 63)

Following are recent research findings from the work of the social psychologists discussed above. These studies have generally been undertaken with children prior to the adolescent years and under laboratory conditions.

Krappmann (1985) in a cross sectional study of children, ages 6-12, from three classrooms recorded in field notes and on videotape the interaction strategies that children use in problem situations. Data were also collected on life events, school achievement, and family situations. He indicates that children's capacities develop best when the active contribution of the child is accepted and the reactions between partners are reciprocal. Social relationships are important vehicles of meanings and rules which are necessary in order for the participants to contribute adequately to interactions and to learn from them. Cognitive development can be enhanced by social relationships among children only when the children have the opportunity to test conflicting ideas, to discuss them, and to decide to accept, reject or modify them. The research appears to support the tendency that social experiences in the relationships of peers of the same age, whether defined by closeness, intensity, or type of integration in peer relationships, or by a solid and influential affiliation with a group or an association, do correlate with school achievement.

Perret-Clermont (1980) and Perret-Clermont and Brossard (1985) using variations of classical Piagetian tests on transferring liquids between different containers were able to illustrate in a laboratory setting that children ranging in age from four to seven and working in pairs do better than children working individually with regarding the solution of difficult problems. Children who work with less advanced peers do not regress. For a task to have educational value, it is not sufficient to merely engage children in joint activity; there must also be a confrontation between different points of view. The cognitive conflict which is generated out of social interaction is seen to be the driving force for intellectual development. The effects of modeling are ruled out.

The cognitive level of students appears to be influenced by the socio-cultural origins of the person. Those from a privileged background demonstrate a higher cognitive level than the underprivileged. Boys sometimes show a higher cognitive level than girls. Participation in the interactions with other children appear to reduce or eliminate the differences attributed to social origins or sex. The amount of cognitive progress depends on the conditions of the interaction and the developmental level of the child at the time of the interaction.

> Concepts like 'socio-cultural handicaps' are of little use for describing the processes which determine, in our research, these differences; differences which are sometimes (but not always...) liable to disappear after simple (but adequate!) experimental interaction situations lasting no more than ten minutes. (Perret-Clermont & Brossard, 1985, p. 316)

Also, there is some indication that when the students are of a similar cultural background as the researcher, a greater social ease exists which gives the students a greater chance to progress than other students.

Rutter (1985) presents a review of the research literature which focuses on the influences of the family and the school on cognitive development. According to Rutter the notion that stimulation promotes cognitive development is misleading. The reciprocity of the interactions between persons is critical as is the variety and meaningfulness of the content of the interactions and the active role taken by the child. Influences such as family discord and bereavement have an impact on social behavior, but appear to have less of an impact on cognitive development. First born children show slightly higher scholastic achievement and verbal intelligence scores which may result from more parental interaction with the child and pressuring of the child to perform although the findings are not conclusive. The richness of the family environment appears to enhance the IQ of children from socially disadvantaged backgrounds when the children are adopted into socially favored homes. Intervention programs can produce important cognitive gains, but after the intervention ceases, the benefits diminished over time.

Family discord, discontinuities in parenting, or parental deviance may increase a child's socioemotional or behavioral problems, but the risks for intellectual impairment is probably slight. What does appear to influence scholastic attainment is the degree to which the emotional or behavioral problems create a situation for the child which does not permit him/her to function in the classroom. The eventual result of unacceptable classroom behavior does create difficulties in scholastic achievement. Consequently, children's experiences while growing up have important effects. Major changes in the life of the child will have major effects on cognitive development throughout childhood. While the effects of bad experiences can be minimized, the good experiences can also be neutralized. No specific critical period seems to exist for cognitive development.

Achievement is often influenced by the side effects of factors such as family discord. Ways in which children can be helped to minimize the negative effects are: a strong responsiveness by the parents to the child's signals, varied and positive reciprocal interactions with parents and others, a wide variety of interesting experiences with parents and others, and the realization of the effects of family discord with concomitant attempts to minimize the discord or its effects.

Tizard (1985) focuses directly on the social relationships between children and adults because the literature is not clear what children learn from adults compared to what children learn from each other. The study which was reported explored the conversations of 30 girls both at home and at nursery school who were within three months of being four years old. Tizard compares the differences between parent/child talk at home with teacher/child talk in school. Teachers tend to focus on verbal skills and simple concepts while parents focus on the content of the talk which more readily conveys aspects of the culture. Teachers dominate the discussions regarding the amount and direction of the talk while parents share discussion time more evenly with children. Teachers tend to question the child and ignore their intellectual curiosity.

Four year olds ask their parents 26 questions per hour while at school only two questions per hour are asked. Of the questions asked the teachers, most are business oriented such as asking where the glue is. Teachers give fuller answers to intellectual questions, but these questions are seldom asked by students. Teachers ask traditional questions which are used to assess students' knowledge and to develop skills. Tizard (1985) indicates that:

> If, as we believe, asking questions and clarifying confusions plays an important role in the child's intellectual growth, and in the process of inducting her into her culture, an educational setting that does not capitalize on this tendency seems handicapped from the start. (pp. 124-125)

Another factor that leads to the educational advantage of the home is the emotional intensity of the parent/child relationship. It is within the context of this intimacy that a trusting relationship exists in which thoughts can be shared freely. Tizard suggests that teachers can improve their impact by becoming more parent like in the quality of their relationships with students. In this way the teacher can become more in tune with the intellectual needs of the students. The following characteristics of parent/child relationships are given: a depth and intensity of conversations, a closeness of the relationship, a trust which allows for expression of anxieties and fears, a definite idea about what the child should learn, a greater knowledge of the child by the parent which makes communication easier, a sensitivity of the mother to tune in to the meaning of the child's remarks, an intimate knowledge of the child which results in a better match of the education task and the ability of the child, an intimate knowledge of the child which makes it easier to relate present to past experiences which assists the learning process, and a connection of home experiences to the experiences in the surrounding world.

Hartup (1985) reviews the data of other researchers which he believes demonstrates the importance of close relationships for cognitive development. He indicates that there is a connection between close relationships and the fostering of the executive functions in cognitive development such as planning, monitoring, and outcome checking skills used in problem solving. Close social relationships are important because:

> ...The evidence merits the hypothesis that , as a cognitive mediator, the mother is not just ' any old adult' and that a friend is not merely 'one of the gang;' rather, these are special individuals playing special roles in cognitive development. (Hartup, 1985, p.75)

Socio-cognitive conflict in cognitive development. Socio-cognitive conflict within social relationships has been shown to play an important role in the mental development of children and is not simply the consequence of imitation (Ames & Murray, 1982; Bearison, 1982; Bell, Grossen, & Perret-Clermont, 1985; Doise & Mugny, 1984; Glachan & Light, 1982; Hinde et al., 1985; Mugny & Doise, 1978; Mugny, DePaolis, & Carugati, 1984; Perret-Clermont, 1980, Perret-Clermont & Brossard, 1985). Bearison states that this conflict does not occur in isolation, "Cognitive conflict does not occur as a singular perturbation that suddenly disrupts the cognitive equilibrium of a thinker in solitary reflection" (1982, p. 215). Instead the

conflict depends on the intercession of one or more others. The conflict provides the impetus for mental restructuring. Those students who do not have the opportunity to take into account other's viewpoints do not progress as rapidly (Perret-Clermont, 1980; Perret-Clermont & Brossard, 1985). It appears that cooperative problem solving is not adequate to bring about the desired changes and not all children benefit equally from the conflict (Bell et al., 1985).

The conflict needs to be strong in order to create a disequilibrium among the partners. Care needs to be taken so that the conflict is directed at the task and does not become a negative factor which is taken personally by the students. The disequilibrium can arise in several ways. Children at different cognitive levels involved in solving a problem can disagree regarding possible solutions. Partners at similar cognitive levels may reach different conclusions. Models who are more cognitively advanced such as the teacher can question proposed solutions. Only when the learning partners give different answers do the partners progress. The result is that a child who seriously considers another point of view will make progress (Doise, 1985).

The influence of peers versus adults. Although some researchers have found that young children seem to learn more in groups of peers as opposed to groups in which adults are present (Damon, 1984; Damon & Killen, 1982; Perret-Clermont, 1980, Perret-Clermont & Brossard, 1985). Doise and Mugny (1984) notice similar patterns of growth in the various sample group configurations including those groups containing adults. Generally, their research shows that children can do some tasks together that they can not do alone. Wertsch (1978) suggests that a caregiver with a long standing relationship with a child would be more effective than a casual acquaintance in tuning his or her discourse to the child's abilities. Forman and Cazden (1985) concluded from their research that even though human experience needs to be grounded in adult-child interactions, the school setting imposes serious limitations for adult- child interactions. Therefore, peer relationships can function as "intermediate transforming contexts" for children in the school. Also, peer relationships are of a different order than relationships with adults. Peer interactions in classroom assignments allow children to try out behaviors like giving directions with other children whereas children seldom give directions to adults.

Cooperative Learning

Cooperative learning strategies have many underlying principles similar to those presented by the social psychologists discussed previously although the roots of the two approaches appear to be somewhat different. As a result of meta-analyses of more than one hundred studies, the effects of cooperative learning indicate several positive outcomes (Johnson, Johnson, & Holubec, 1986; Johnson, Johnson & Maruyama,1983; Newmann and Thompson,1987; Slavin, 1983a, 1983b). In cooperative learning groups there is a positive interdependence among students' regarding their learning goals; they "sink or swim together" (Johnson et al., 1986). Some of the positive outcomes brought about by using cooperative learning strategies reported by Johnson et al. (1986) include: increased academic achievement, more positive relationships among individuals from different ethnic backgrounds and between handicapped and nonhandicapped individuals, more positive relationships across ethnic and handicap lines, more use of higher reasoning strategies and critical

thinking skills, an increased liking of classmates, an improved perspective taking, and an improved self-esteem. Slavin (1983a; 1983b), in one synthesis of 28 studies using cooperative learning techniques and another addressing 41 studies found to be methodologically adequate, found similar results as did the Johnsons and their colleagues although not to the same extent.

Cooperative learning methods have been found to promote higher achievement than do competitive, individualistic, or traditional learning methods (Johnson et al., 1986; Johnson et al.,1983; Slavin, 1983a, 1983b). Participation in cooperative learning groups produces conflict among ideas expressed by the participants. When handled appropriately, these controversies increase students' motivation, achievement, and retention of the material which is being studied. More frequent oral participation occurs. Oral rehearsal provides the opportunity for increased retention and consequently better achievement.

Students tend to like each other better as a result of their involvement in cooperative groups. The mutual liking increases their willingness to encourage and to assist each other to learn. These behaviors can also be described as increased intimacy among peers which, in turn, contributes to the learning process. The teacher and other adults in the school benefit from the improved attitude of the students because the findings show that students like the teacher better, and perceive the teacher as being more supportive.

Most of the research regarding cooperative learning groups has been directed at elementary school classrooms. Adolescents in secondary schools may differ in significant ways from preadolescents in their response to cooperative learning. Newmann and Thompson (1987) compiled a "best evidence" synthesis of the 27 research studies described as being of high quality which addressed the effects of cooperative learning on adolescents' achievement. Their conclusions indicate that cooperative learning groups generally have a positive effect on the academic achievement of adolescents, particularly early adolescents. In the development of higher cognitive skills cooperative learning groups appear to have a great deal of potential, but researchers thus far have not explored this area sufficiently.

Affective Education

Affective education is an approach to learning which deals with the emotional and psychological development of the individual. Proponents of affective education believe that schools overemphasize the importance of knowledge acquisition at the expense of other personal attributes so that the development of feelings and other sensibilities tend to be ignored. Advocates of this perspective state that the various domains should not be separated, and any attempt to do so creates artificial categories which do not reflect reality. Moreover, all of the various domains are closely intertwined and have an important influence on each other. Therefore, affective development contributes to cognitive development.

Rogers (1983) presents an extensive review of the literature supporting the powerful impact of affective behavior on the part of teachers. Much of the research on affective education which Rogers presents has been conducted by Carkhuff and Aspy. More

specifically, Aspy and Roebuck (1969, 1972, 1982) have have studied the effects of the teacher's level of interpersonal functioning within a wide variety of group sizes and found that the teacher's interpersonal functioning is related to a wide variety of school behaviors including pupil achievement.

Carkhuff (1982) concluded in his review of 137 studies of living, working, and learning outcomes found that affective-interpersonal dimensions are related to effectiveness in any human endeavor. High levels of utilization of affective-interpersonal skills generally guarantee success in a chosen undertaking while low levels tend to ensure only a random chance at success. In a study conducted by Farley (1982), teachers were trained in the use of 15 interactions which were part of a program known as TESA (Teacher Expectations and Student Achievement). A class of mixed ability students a trained teacher consciously interacted with all students in an equitable manner. The effects of the TESA behaviors developed especially to give equitable attention to low achieving students were to be compared to a control group where teachers did not receive the TESA training. The outcome was that all students experienced academic gains when compared to the control class, not just the low achievers.

The Influence of Persons

Significant adults. Galbo (1984, 1986, in press) has compiled a synthesis of the research literature focusing on adolescents' perceptions of significant adults. These important adults include the categories of role models, reference groups, and significant adults. Although the literature surveyed does not address cognitive development directly, there is an important tangential connection to the topic. A wide variety of adults are perceived by adolescents as important and have an impact on their lives, particularly related adults. The most important of the related adults are generally parents, and an extensive body of literature exists which shows the effects of the home and family on the cognitive development of the child. Less is known about the influence of parents on adolescent's cognitive development, but parental influence is nevertheless considered to be extensive. How this influence functions is not well understood particularly as the influence relates to cognitive development.

Approximately half of the adults chosen as important are not related to the adolescents (Blyth, Hill, & Thiel, 1982; Montemayor & Van Komen; Galbo, Demetrulius Mayer, Crippen, 1989). These nonrelated significant adults include, but are not limited to, teachers, parents' friends, friends' parents, clergy, neighbors, and coaches. Nonrelated significant adults appear to play an important role in the development of adolescents especially when familial ties are not strong. Also, the adults can provide access to opportunities for development which are not acquired within the context of the family (Cochran & Brossard, 1979). Usually, nonrelated adults are discussed in the context of providing emotional and psychological support to adolescents rather than the relationship contributing to intellectual development in any way.

The ways in which nonrelated significant adults contribute to cognitive development are likely to be similar in fashion to those attributed to parents, especially when the relationship with the nonrelated adult approaches the degree of intimacy found in families. When nonrelated significant adults are viewed as close friends by

adolescents, the change in the intimacy of the relationship would likely alter the extent of impact on youths. Given what looks like the continued disappearance of the extended family, nonrelated adults may be able to enrich the environment of adolescents and contribute in ways that enhance adolescents' learning capacities. If a social basis for knowledge is found to have credibility, then the importance of significant adults for adolescents becomes much clearer.

The impact of others. The influence of other persons is pervasive and incessant throughout life, but researchers have only begun to understand how extensive this influence actually is. The traditional arenas of influence associated with nurturing the young still require considerable study, but in the last decade a new technology in the medical field has provided the means to see previously unnoticed interpersonal influences very dramatically. This additional insight into the self is provided by Lynch (1985) who has conducted research over the past twenty years trying to understand how human relationships and human loneliness affect cardiovascular health. He describes recent changes in the way patients with hypertension (high blood pressure) are monitored. The traditional technique using a sphygmamomenometer would indicate the person's blood pressure only at the time of administration. A new computerized instrument has been developed which can read the pressure at the time of administration as well as monitor changes from moment to moment. This technique has shown that patients' blood pressure rises when they speak.

As a person begins to speak, the speaker's blood pressure increases significantly. Subjects who read aloud, by themselves in a room, or to another person show similar results. When engaged in dialogue, it is not simply the emotional content of the conservation, but the talking itself which brings on blood pressure changes regardless whether the persons are hypertensive or not. Talking about feelings does not increase blood pressure more than simply reading aloud. Antihypertensive medicines can not keep the pressure from rising. The magnitude of increase is much greater for hypertensives. The dramatic increases in pressure are not visible to observers, and the greater the change, the less likely the person undergoing the change is aware of it. In effect, the data indicate that to whom a person is speaking is more important than the emotional content of the words spoken. Lynch's findings demonstrates that the impact of persons on each other is an on ongoing, and sometimes dramatic, process which is likely to have important, but not well understood, implications for understanding how learning occurs.

The Anthropology of Education

Although this section does not present the results of a substantial body of research literature supporting the importance of social relationships in cognitive development as do the above examples, Erickson (1982) critiques the anthropology of education literature which is extensive. He states that the anthropology of education has generally focused on those aspects of the curriculum which are hidden rather than obvious. Although the effects of the hidden curriculum are important subjects for study in traditional anthropology as are the cultural impacts of schooling, the specifics of the teaching process have not received much attention. He reviews data which suggest that a shift needs to occur which redirects the focus of research from the social group

to individuals interacting with the environment. More specifically, school learning, or taught cognitive learning as it is called by anthropologists, has been given little attention in the field of the anthropology of education.

Taught learning is described as the kind of learning which is deliberate and intentional and occurs throughout the life cycle with the help of many different teachers including related and nonrelated adults. Taught learning does not occur in isolation. The learning environment includes other people whether in the form of a classroom teacher or another person who fulfills the role of the teacher. In order to understand the learning which takes place, more attention needs to be given to the interface between the individual and the learning environment (those who are the teachers). The dilemma is: "how to demonstrate relations of mutual influence between general social organization and the actions of individuals in specific social circumstances" (p. 153).

In order for taught learning to be adequately assessed the researcher needs to achieve a level of intimate acquaintance and continuity with the mind of the learner in order to accurately see the learner's way of thinking before, during, and after the learning occurs. The work of Vygotsky (1978) points the way to appropriate theory and methods. A full understanding of the learning process requires that face to face encounters be thoroughly studied even though wider influences cannot be overlooked. "The curriculum of directed instruction, as it is experienced in real life as a learning environment, is always a matter of the content of social relations and the content of subject matter being engaged together in successive moments of real time" (p. 172). Erickson indicates that additional attention is being given to taught learning but, the surface is only being scratched.

The Importance of an Enriched Social Environment

Diamond (1988) spent 27 years studying the impact of environmental influences primarily on the mammalian brain. The implications of her findings for humans suggest that active self-guided exploration and kinesthetic feedback are needed in order for learning to occur. Active involvement in the environment is necessary for influencing cortical development. Passive observation is not enough; one must interact with others regarding the physical and social environments. It appears that inactivity may produce negative results while activity will assist in maintenance of a healthy life during old age. The effect of the activities is enhanced when conducted with other persons. Diamond believes that her findings support the claims of educators like Dewey who advocated the idea that a child should be provided a wide range of experiences to assist intellectual development.

Diamond's work was conducted on rats. Direct comparisons between rat brains and human brains are not possible, but basic principles which are established from experiments on rats can be applied to humans. For example, she indicates that much of what we know about the human reproduction system and its hormonal relationship has been from the study of rats. Also, the kinds of brain measures used on rats and the results of those findings are applicable to the study of rats or humans. Diamond and her colleagues found that various types of experiential environmental conditions can alter the anatomy of the outer layers of the mammalian brain, which in turn affects

the learning ability of the organism. Rats that spend time in stimulating, interesting environments demonstrate a significant, measurable change in cortical thickness and larger nerve cell dimensions in the brain than occur in the brain of their brothers living in impoverished conditions.

An enriched social environment contains many animals in a large cage with a variety of novel objects (toys) for the rats to explore. The impoverished environment contains animals which are caged singly, and neither objects, companions, nor larger living spaces are available. The enriched environment is one which introduces more stimulation to the body's surface receptors than does the impoverished one, whether in rats or humans. The enriched rats are better learners in various problem-solving settings. Also, rats who are housed with other rats and toys together appear to have better developed brains than rats who are either alone with toys or are together, but without toys. Other animals besides rats have demonstrated similar changes.

When the enriched environment provides a general multisensory input, more of the cortex changes. When the enriched environment has a more narrow focus such as learning to run a maze, only one area of the brain is affected. There are possible negative effects of too much stimulation and time for periods of consolidation and assimilation minimize possible negative effects. Also, the brain does not work by itself, and each part of the brain interacts with its other parts. In other words, care of the physical, psychological, and intellectual parts of an organism becomes essential if the benefits of an enriched environment are to be maximized.

Diamond presents a convincing case that an enriched environment affects brain structure in various mammals. The resulting changes in the brain appear to influence the animals to be smarter. Although rats are not humans, the suggestion that an enriched environment would have similar effects on humans is not too far fetched and can be supported by the work of other authors such as Rutter (1985) who is discussed later in this paper. Social relationships provide one way to enrich the world of other humans, but more needs to be known about how and if these relationships contribute to cognitive development in children.

Other Sources of Data

Other sources of data exist, but they have not been presented in order to keep this review more manageable. Some examples include the research literature addressing peer and cross-age tutoring which is quite extensive and supports the importance of social relationships in the academic development of the tutors and tutees (Fogarty & Wang, 1982; Paolitto, 1976). Another topic which is likely to be productive is language development which is essentially an interactive process and contributes to cognitive development in fundamental ways. The literature on brain development as it is applied to education is, also, likely to make important contributions.

Conclusions

The research literature provides the basis for a few important general conclusions to be drawn. For example, the literature strongly supports the idea that social relationships contribute in significant ways to cognitive development. The basis for

this conclusion comes from a wide variety of sources which have, for the most part, developed independently from each other. The evidence also tends to be indirect rather than direct; except for the research conducted by social psychologists from the European School, none of the research specifically addresses the topic of this review. For example the work of Diamond on brain development in mice appears to be far afield from the research addressing affective education conducted by Carkhuff and Aspy. These seemingly disparate sources provide a substantial amount of evidence which, in total, appreciably contributes to the case supporting the connection between social relationships and cognitive development as it applies to academic achievement.

A few very important conclusions can be drawn across disciplines. Two elements which are consistent across several areas are cognitive conflict and reciprocity. Cognitive conflict within the context of social relationships appears to have a significant impact on cognitive development. Reciprocity between persons engaged in a social interaction also seems to be an important element in the social construction of knowledge. In addition, each discipline represents a substantial body of research literature in its own right. Within each of the bodies of literature are findings which are unique to the discipline and have potential implications for understanding cognitive development and could be used as starting points for future research.

Nearly all the research discused in the review above has focused on childhood rather than adolescence. Research directed at children is useful to the degree that cognitive development in children has a direct bearing on the eventual cognitive development in adolescents, but children are developmentally different than adolescents in various ways. In addition, most prior research has focused on social settings other than schools. These limitations minimize the ability to directly apply the conclusions to secondary school educational practice until further study provides data specifically applicable to adolescents within the school setting.

Modifying Cultural Impediments

Other conclusions are based on a less substantial body of research although these findings contribute to a clearer overall picture of the role of social relationships. For example, one conclusion of this type suggests that some qualities of the social relationship, such as certain types of conflict, may mediate the sociocultural impediments of various forms of deprivation and hardship (Diamond, 1988; Perret-Clermont, 1980; Perret-Clermont & Brossard, 1985). Along the same lines the enrichment of life experiences may have a similar effect on children who come from impoverished backgrounds (Rutter, 1985). If these findings could be substantiated, there would be a need to reconsider the usefulness of the concept of cultural deprivation as well as the need to reevaluate programs attempting to improve the condition in school and in the family.

Matching Backgrounds

Matching the backgrounds of the teacher and the learner may enhance the cognitive abilities of certain students. The importance of the influence of other's on youths' lives may need to be more seriously considered based on the interesting insights of Lynch as well as the findings regarding the impact of investigators on their subjects provided

by the social psychologists. Lynch has found that the presence of another can cause dynamic physiological changes depending on who the other person is. Perret-Clermont and her colleagues noted that if the researcher was of a similar cultural background as the students, the students would have a greater chance of progressing than others. In other words, when the persons working together are of similar backgrounds, there is a tendency for the relationship to be facilitated (Bogen, 1978; Guild & Garger,1985; Wittrock, 1981) which may, in turn, have potential impact on cognitive development and subsequent academic achievement.

The Quality of the Relationship

Various qualities in social relationships between persons appear to influence cognitive development. According to research conducted by McGowan and Johnson (1984), the qualities which positively influence childhood intelligence are the extent of the mother's education and reciprocal parent and child interactions. Galbo (1986) and Galbo et al. (in press) discuss characteristics of significant adults which are perceived as desirable by adolescents. Some of the attributes which are mentioned are: availability, trustworthiness, high expectations, caring, helpfulness, and honesty. Based on these descriptive data, adolescents appear to respond favorably to interactive, reciprocal relationships with other adults. Tizard (1985) also found that adults who wish to have an impact on the development of children need to maintain a quality of relationship with youths similar to parents. Yet, factors such as the degree of intimacy and attachment in the relationship are seldom studied regarding their role in enhancing the cognitive development of youths in more traditional settings. Conversely, short term discord and disruptive life continuities such as divorce, death of a family member, and illness can interrupt cognitive development although the effects are thought to be generally short term (Rutter, 1985).

Adults as Agents of Influence

Persons of different generations may influence cognitive development in others different ways (Hinde et al., 1985; Lynch, 1985; Perret-Clermont, 1980). One dimension of status is addressed by Youniss (1983) who states that Piaget believed peers to be a better source for influencing cognitive development than adults because of the social equality of peers. Adult and child interactions are viewed as an obstacle to development due to the constraints resulting from a fundamental inequality of social status. On the other hand, Doise and Mugny (1984) acknowledge the potential problem of the adult authority figure, but do not believe the adult's influence to be necessarily debilitating. Some children are inhibited by the presence of adults, but any negative impact can be minimized in various ways. An adult can systematically challenge children without placing a response model before them. Two adults can advocate two mutually opposing viewpoints which are also incorrect. Clarification of the role of adults and youths in a relationship becomes especially important since both may have unique contributions to the cognitive development of the individual.

The Importance of Language

Language is inherently social in nature. This interactive quality becomes an essential ingredient in the facilitation of cognitive development. Vygotsky (1962, 1978) believed

that speech was critical for the development of intelligence. The accumulation of experiences through the use of language provides the bases for acquiring further experiences and provides the means to move knowledge from the interpersonal realm to the intrapersonal. According to this perspective, experiences must be dealt with in the social world before they can be internalized, and one of the most social of human experiences is speech. Hart (1978, 1983) states that research on the brain suggests that students must talk in order to learn. Language provides a primary way for acquiring experiences, and it requires social relationships for an appropriate context.

Informal Learning

The primary focus of this paper has been on the more formal, structured learning associated with schooling. Bronfenbrenner (1980) discusses that it is essential to understand the role of informal learning and how it functions differently from the more formal variety. He states that in order for children to develop, they must be involved with one or more adults involved in some form of activity. This informal or nonstructured learning occurs when there is no deliberate effort to teach or to learn. Examples of this type of learning are evident during initial language development as well as during the play of children. The nonstructured learnings may be essential for future learnings, including the academic type associated with school.

Early nonstructured learnings may take place largely at a nonconscious level, providing a basis in personal experience which allows the child to begin to sense the underlying meanings of the subject matter presented in school or in other community settings. Due to the growing isolation of the young from meaningful interaction with adults, the opportunities for the young as well as for the adult to benefit from such interactions is minimized (Bronfenbrenner, 1979, 1980; Hetherington, Cox, & Cox, 1978). The lack of youths' contact with adults may, in fact, result in impaired cognitive functioning at least temporarily.

Implications for Teacher Education

Inservice and preservice teacher education programs continually seek ways to make teachers more effective. A large portion of this response, currently, has been in reaction to rising criticism about teacher education programs and perceived teacher incompetence. Reform measures often propose that improving the teacher is the primary vehicle for improving schools, student learning, and education in general. The teacher is viewed, simultaneously, as the cause and the means of solving existing educational problems. Unfortunately, this expectation is not likely to be met by teachers, because they are only part of the learning equation although a very critical part. Until attention is paid to the students' ability to communicate which is largely based on the extent and quality of social experiences with others, especially important others inside and outside of school, the classroom teacher will continue to be a convenient scapegoat.

One of the conclusions from this review illustrates that one primary characteristic of teaching and learning is its reciprocal nature. The role of the teacher is only one part of the process of what constitutes effective education. The student becomes the other important factor, but not in isolation. The student and teacher need to be viewed in

reciprocal interaction each contributing a separate, but essential, component to the learning and teaching act. Consequently, much more will need to be understood about how students become more independent learners.

By developing skills similar to the independent learner, students would become less dependent on specific teacher traits in order to function effectively in the school. In addition to addressing the teacher's responsibility to learn how to cater to the wide variety of learning styles in the classroom, the students also need to learn how to respond better to a wide variety of adult teaching styles. To do this we will need to learn more about the nature of the student's and teacher's input and how these behaviors interact.

Other equally misleading reform measures contribute to the complexity of the problem for the same reasons. Motivating students to try harder, raising standards, and more time in the classroom will not be the difference that makes a difference because important pieces regarding the way humans learn are still missing. Based on the findings of this review, there is very good reason to suggest that an important part of the puzzle resides in unraveling the role of social relationships in cognitive development. Those findings would then guide practitioners on how to be more effective while putting the actual responsibility of the teacher in proper perspective. As a result, the benefits of the school experience would be further maximized for teachers and students alike.

The role of teacher educators in bringing attention to the importance of social relationships in cognitive development is critical. Existing data reside in diverse categories which need to be studied further, synthesized, and translated into language and practice which is useful to educational practitioners. Considering the present state of knowledge regarding this topic, the challenges ahead are formidable, yet full of promise for providing additional insights into how learning occurs. Plenty of clues exist regarding the directions in which future research might proceed.

Research Questions

The conclusions reached in this review clearly support a critical connection between social relationships and cognitive development. In addition, many of the ideas discussed in this paper have been written about in the past by theorists and they are also derived out of the personal experience of many practicing educators. Unfortunately, this information is in a form which is not directly useful to education practitioners nor researchers. The translation of this knowledge from its present form to the field of education must come from interested educators themselves.

Other confounding problems exist. Since the conclusions which are drawn have been based on the research with children, the findings are not directly useful to those who work with adolescents. Also, social relationships are viewed as having applicability to socioemotional development, but the importance of the connection between social relationships and cognitive development as it is manifested in academic achievement must become well established if any substantive progress is to be made regarding the conclusions identified above. Cognitive development needs to be seen more in the context of overall human development rather than an isolated process. A clear

connection between cognitive development and academic achievement is also necessary in order to cement their relationship in terms of how the two are viewed by educators.

Qualities of the Relationship

It would be useful to determine if there are special teacher or child qualities within the student/teacher relationship which make a difference in developing the cognitive abilities of children. Or, are the qualities unique to each situation? Certain qualities of a relationship may not be necessary for the development of particular abilities, while others may be absolutely essential. These characteristics might then be cultivated in those who work with youths and in the youths themselves. Perhaps the desirable qualities are teachable or they may be developed at an nonconscious level as a result of one's nurturing. This kind of information would be useful to those who work with and develop policy affecting children.

Another question along this same line is what characteristics of social interaction within and outside the school environment contribute to desired forms of cognitive development as they affect academic achievement? Do the qualities of a relationship which contribute to cognitive development differ depending on the developmental level of the persons involved (adults, children, parents)? Do the qualities vary depending on whether the learning situation is formal (in school) or informal (out of school)? If specific learnings with certain people acquired outside of the school setting are critical for improved academic achievement, more serious attention could be paid to assists youths in attaining the necessary experiences.

Determining Useful Strategies

Once the data attending to qualities of the relationship which are important are identified, the attention could then be given to developing strategies to be used in social interaction to bring about specific cognitive outcomes? Also, it would be necessary to understand what conditions are necessary for certain strategies to be successful?

The Influence of Others

The role others play in enhancing or inhibiting cognitive development in youths would be important to know. In what ways are children actually influenced by various others such as adults, peers, the principal, the teacher? What are the differences between the quality and quantity of adult interaction experienced by "good" students compared to "poor" students, between immature and mature students? How does the intensity of the relationship (intimacy/attachment) influence cognitive development? What are the effects of matching students and teachers backgrounds? These various perspectives addressing the nature of the influence of others would help us to understand how we all fit into the cognitive development of others and how this development results in subsequent academic achievement.

The Effects of Life Experiences

In what ways do life experiences outside of school prepare one for the work required in school? What are the long term or temporary effects of various significant life events on a child's performance in school? In what ways can the school remediate the lack of interaction with others outside of school? How do significant interactions differ from more mundane everyday interactions regarding their influence on cognitive development? In what ways can the effects be neutralized or remediated?

Closing Statement

Occasionally an opportunity arises which has the potential to extend considerably our perspective regarding the nature of the learning process. The connection between social relationships and cognitive development as it pertains to academic achievement which is discussed in this review provides such an occasion. Alternative views as suggested by this research would likely raise issues that would require us to rethink our past practices regarding schools and our treatment of children in relational, interconnected, and interdependent terms. We could then benefit from this knowledge by using it to guide us in our attempts to create a more meaningful educational process impacting ourselves and the children which we serve.

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